

WHAT IS CLAIMED IS:

1. A filter element for filtering a gas stream, comprising at least one filter mat positioned in the gas stream to which particles in the gas stream can adhere and be removed from the gas stream, wherein the at least one filter mat comprises a plurality of layers of a filter material and a membrane disposed between the layers.

2. A filter element according to claim 1, further comprising a pre-separator nonwoven web on an inflow side of the at least one filter mat.

3. A filter element according to claim 1, further comprising a post-separator nonwoven web on an outflow side of the at least one filter mat.

4. A filter element according to claim 1, wherein the at least one filter mat comprises from 1 to 20 individual layers made of glass fiber paper on each side of the membrane.

5. A filter element according to claim 1, wherein the at least one filter mat comprises from 1 to 20 individual layers of synthetic resin fiber nonwoven web material on each side of the membrane.

6. A filter element according to claim 1, wherein the at least one filter mat comprises from 1 to 20 individual layers of felt on each side of the membrane.

7. A filter element according to claim 1, wherein the at least one filter mat has the configuration of a hollow cylinder and is mounted on a perforated central tube so that the gas stream flows radially through the filter element from the outside in and exits the filter element axially from the center of the cylindrical filter element.

8. A filter element according to claim 1, wherein the filter element is used for de-oiling an airstream in a compressor or a vacuum pump.

9. A filter element according to claim 1, wherein the membrane is a highly porous polymer membrane having a porosity greater than 60% and a pore size between 0.1 μm and 10 μm .

10. A filter element according to claim 1, wherein the membrane has a symmetrical or asymmetrical structure.

11. A filter element according to claim 1, wherein the membrane has a thickness in the range of 25 μm to 250 μm .

12. A filter element according to claim 1, wherein the membrane is made from one or more of polysulfone, polyethersulfone, Teflon, polyether, polypropylene, polyester, and mixed esters.

13. A filter element for filtering a gas stream, comprising at least one filter mat positioned in the gas stream to which particles in the gas stream can adhere and be removed from the gas stream, wherein the at least one filter mat comprises a plurality of layers of a filter material and a membrane disposed between the layers, wherein the membrane includes at least one layer of nanofiber material that is made from polyamide and has a fiber diameter of 50 nm to 1000 nm and a specific weight of 20 g/m^2 to 200 g/m^2 .